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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/626,868	07/25/2003	Milfred Dale Hammerbacher	204694.00099	9785
27160	7590	11/30/2006	EXAMINER	
PATENT ADMINISTRATOR KATTEN MUCHIN ROSENMAN LLP 1025 THOMAS JEFFERSON STREET, N.W. EAST LOBBY: SUITE 700 WASHINGTON, DC 20007-5201			TRINH, THANH TRUC	
			ART UNIT	PAPER NUMBER
			1753	
DATE MAILED: 11/30/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/626,868	<b>Applicant(s)</b> HAMMERBACHER ET AL.	
	<b>Examiner</b> Thanh-Truc Trinh	<b>Art Unit</b> 1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 25 July 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) 13 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>05/18/05</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Specification***

1. The disclosure is objected to because of the following informalities:

Page 12 line 26, "conFIG.d" should be -- configured --.

Page 14 lines 24-25, Reference Nos. 69, 68, 70 are not found in any disclosed figures.

Page 19 line 20, "forma" should be -- form a --.

Appropriate correction is required.

### ***Claim Objections***

2. Claim 13 is objected to because of the following informalities:

Line 11, ".mu.c" should be --  $\mu$ c --.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-15 are rejected under 35 U.S.C. 102(e) as being anticipated by

Hamakawa et al (US Patent 6706959).

Regarding claim 1, Hamakawa et al disclose a photovoltaic apparatus comprising a plurality of approximately spherical photoelectric conversion elements 2 including a first semiconductor layer 7 and a second semiconductor layer 8 which is located outside the first semiconductor layer. The second semiconductor layer has an opening 9 through which a portion of the first semiconductor layer is exposed. [See Fig. 1 or Claim 1(a)]

Hamakawa et al also disclose a support structure 3 including a first conductor 13, a second conductor 14, and an insulator 15 disposed between the first and second conductors. The support having a plurality of recesses 17 which are arranged adjacent to each other. The inside surfaces of recesses 17 are constituted by the first conductor 13 or a coating formed thereon. The photoelectric conversion elements 2 are disposed in the respective recesses so that the photoelectric conversion elements are illuminated with light reflected by part of the first conductor or coating which constitute the recess. The first conductor 13 is electrically connected to the second semiconductor layer 8. Also, the second conductor 14 is electrically connected to the exposed portion of the first semiconductor layer 7. [See Claim 1(b) or Fig. 1]

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Regarding claim 2, Hamakawa et al describe the outer diameter of the photoelectric conversion elements is in the range of 0.5 mm to 2.0 mm. (See claim 2)

Regarding claim 3, Hamakawa et al teach that the opening of the second semiconductor layer has a central angle of  $45^{\circ}$  to  $90^{\circ}$ . (See claim 4)

Regarding claim 4, Hamakawa et al disclose a photovoltaic apparatus as described in claim 1, wherein the recesses of the support have respective openings of a polygon of which ones adjacent to each other continuously. Each of the recesses narrows toward a bottom thereof. The first and second semiconductor layers of each photoelectric conversion elements are electrically connected to the second and the first conductor, respectively, at the bottom or in a vicinity thereof of the recess. (See claim 5)

Regarding claim 5, Hamakawa et al disclose a photovoltaic apparatus as described in claim 4, wherein the first conductor is provided with a circular first connection hole formed at the bottom or in a vicinity thereof of the recess, and the insulator is provided with a circular second connection hole having a common axial line with the first connection hole. A portion of the photoelectric conversion element 2 in a vicinity of the opening of the second semiconductor layer fits in the first connection hole and an outer surface portion above the opening of the second semiconductor layer is electrically connected to an end face of the first connection hole of the first conductor or to a portion thereof in the vicinity of the end face, and the exposed portion of the first

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semiconductor layer of the photoelectric conversion element is electrically connected to the second conductor through the second connection hole. (See claim 6)

Regarding claim 6, Hamakawa et al disclose a photovoltaic apparatus as described in claim 5, wherein  $D1 > D3 > D2 > D4$ . (See claim 7)

Regarding claim 7, Hamakawa et al disclose a photovoltaic apparatus as described in claim 1, wherein a light-gathering ratio  $x$  which equals to  $S1/S2$  is selected to be in a range of 2 to 8. (See claim 8)

Regarding claim 8, Hamakawa et al disclose a photovoltaic apparatus as described in claim 1, wherein each of the photoelectric conversion elements has an outer diameter of 0.5 mm to 2 mm, and a light-gathering ratio  $x$  of  $S1/S2$  is selected to be in a range of 2 to 8. (See claim 9)

Regarding claim 9, Hamakawa et al disclose a photovoltaic apparatus as described in claim 1, wherein each of the photoelectric conversion elements has an outer diameter of 0.8 mm to 1.2 mm, and a light-gathering ratio  $x$  of  $S1/S2$  is selected to be in a range of 4 to 6. (See claim 10)

Regarding claim 10, Hamakawa et al disclose a photovoltaic apparatus as described in claim 1, wherein the photovoltaic conversion elements have a pn junction

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in such a manner that the second semiconductor layer of one conductivity type having a wider optical band gap than the first semiconductor layer having the other conductivity type does is formed outside the first layer. (See claim 11)

Regarding claim 11, Hamakawa et al disclose a photovoltaic apparatus as described in claim 1, wherein the photovoltaic conversion elements have a pin junction in such a manner that the first semiconductor layer having one conductivity type, an amorphous intrinsic semiconductor layer, and an amorphous second semiconductor layer of the other conductivity type having a wider optical band gap than the first semiconductor layer does are arranged outward in this order. (See claim 12)

Regarding claim 12, Hamakawa et al disclose a photovoltaic apparatus as described in claim 10, wherein the first and second semiconductor layers are made of n-type silicon and p-type amorphous SiC, respectively. (See claim 13)

Regarding claim 13, Hamakawa et al disclose a photovoltaic apparatus as described in claim 12, wherein the n-type silicon of which the first semiconductor layer is made is n-type single-crystal silicon or n-type microcrystalline silicon. (See claim 14)

Regarding claim 14, Hamakawa et al disclose a photovoltaic apparatus as described in claim 1, wherein the first semiconductor layer is a direct gap semiconductor layer. (See claim 2)

Regarding claim 15, Hamakawa et al disclose a photovoltaic apparatus as described in claim 14, wherein the direct gap semiconductor is made of a semiconductor selected from the group consisting of InAs, GaSb, CuInSe<sub>2</sub>, Cu(InGa)Se<sub>2</sub>, CuInS, GaAs, InGaP, and CdTe. (See claim 15)

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh-Truc Trinh whose telephone number is 571-272-6594. The examiner can normally be reached on 8:30 am - 5:00 pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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11/13/06

  
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